

Amendments to the Claims

1. (Currently Amended) An input voice speech pitch normalization device equipped in a voice recognition device for recognizing an input voice speech uttered by any of an unlimited number of speakers based on voice speech recognition sample reference data, and used to change a pitch of the input voice speech to be in a predetermined relationship with a pitch of the voice speech recognition sample reference data, said input voice speech pitch normalization device comprising:

pitch difference determination means for determining a pitch difference between ~~said~~ the input voice speech and ~~said voice~~ the speech recognition sample reference data; and

pitch change means for changing, based on the basis of the pitch difference determined by said pitch difference determination means, ~~said a frequency of the input voice in frequency~~ speech to make the pitch of the input voice speech have the predetermined relationship with the pitch of ~~said the voice speech~~ speech recognition sample reference data.

2. (Currently Amended) The input voice speech pitch normalization device as claimed in claim 1, further comprising:

memory means for temporarily storing ~~said the~~ input voice speech; and

read-out control means for reading a string of ~~said the~~ input voice speech from said memory means, and generating a recognition target voice speech signal, and wherein

said pitch difference determination means ~~comprising~~ comprises:

frequency component analysis means for analyzing a frequency component in ~~said the~~ recognition target voice speech signal, and generating a frequency component signal; and

pitch determination means for finding a base frequency of ~~said the~~ recognition target voice speech signal based on ~~said the~~ frequency component signal, and determining a pitch difference between ~~said the voice speech~~ speech recognition sample reference data and the base frequency to generate a pitch difference signal.

3. (Currently Amended) The input voice speech pitch normalization device as claimed in claim 2, wherein said pitch determination means ~~can stably determine~~ determines the pitch difference

when ~~regardless of said~~ the recognition target ~~voice as being~~ speech is structured by ~~as either~~ a single sound unit or several sound units by finding a first pitch frequency formant of ~~said the~~ recognition target ~~voice~~ speech signal as the base frequency, and ~~by comparing~~ compares the first pitch frequency formant of the recognition target ~~voice~~ speech signal with a first pitch frequency formant of ~~the~~ speech ~~said-voice~~ recognition sample reference data to find ~~said the~~ pitch difference therebetween.

4. (Currently Amended) The input ~~voice~~ speech pitch normalization device as claimed in claim 3, wherein said pitch change means comprises read-out clock control means for generating a read-out clock signal by determining a frequency of a timing clock at ~~the a~~ time of reading from said memory in means such ~~a manner~~ that a frequency of ~~said the~~ recognition target ~~voice~~ speech signal is changed based on ~~said the~~ pitch difference signal, and

ba said memory means outputs, based on ~~said the~~ read-out clock signal, ~~said the~~ recognition target ~~voice~~ speech signal in such ~~a manner~~ that ~~a the~~ predetermined relationship in pitch is established with ~~said the~~ voice speech recognition sample reference data.

5. (Currently Amended) A voice recognition device including ~~the said~~ input ~~voice~~ speech pitch normalization device of claim 4.

6. (Currently Amended) A ~~voice~~ speech recognition device for recognizing an input ~~voice~~ speech uttered by any of an unlimited number of speakers based on ~~voice~~ speech recognition sample reference data, said speech recognition device comprising:

an input ~~voice~~ speech pitch normalization device for changing a pitch of the input ~~voice~~ speech to be in a predetermined relationship with a pitch of the ~~voice~~ speech recognition sample reference data; and

voice speech analysis means for comparing ~~said the~~ input ~~voice~~ speech changed in pitch and ~~said-voice the~~ speech recognition sample reference data to generate a recognition signal indicating the ~~voice~~ speech recognition sample reference data which coincides with the input ~~voice~~ speech.

7. **(Currently Amended)** The voice speech recognition device as claimed in claim 6, further comprising:

memory means for temporarily storing said the input voice speech; and

read-out control means for reading a string of said the input voice speech from said memory means, and generating a recognition target voice speech signal, and wherein

said input speech pitch normalization device ~~pitch difference determination means comprising~~
comprises:

frequency component analysis means for analyzing a frequency component of said the recognition target voice speech signal, and generating a frequency component signal; and

pitch determination means for finding a base frequency of said the recognition target voice speech signal based on said the frequency component signal, and determining a pitch difference between said the voice speech recognition sample reference data and the base frequency to generate a pitch difference signal.

B2
8. **(Currently Amended)** The voice speech recognition device as claimed in claim 7, wherein said pitch determination means ~~can~~ stably ~~determine~~ determines the pitch difference ~~regardless of said when the~~ recognition target voice as speech is being structured as either by a single sound unit or several sound units by finding a first pitch frequency formant of the said recognition target speech voice signal as the base frequency, and ~~compares by comparing~~ the first pitch frequency formant of the recognition target speech voice signal with a first pitch frequency formant of the said voice speech recognition sample reference data to find said the pitch difference therebetween.

9. **(Currently Amended)** The voice speech recognition device as claimed in claim 8, wherein said input speech pitch normalization device ~~further pitch change means~~ comprises read-out clock control means for generating a read-out clock signal by determining a frequency of a timing clock at the a time of reading from said memory means in such a manner that a frequency of said the recognition target voice speech signal is changed based on said the pitch difference signal, and wherein

said memory means outputs, based on said the read-out clock signal, said the recognition target voice speech signal in such ~~a manner~~ that a the predetermined relationship in pitch is established with said the voice speech recognition sample reference data.

10. (New) An input speech pitch normalization device for changing a pitch of input speech to be in a predetermined relationship with a pitch of speech recognition reference data, said input speed pitch normalization device comprising:

a pitch difference determination section operable to determine a pitch difference between the input speech and the speech recognition reference data; and

a pitch change section operable to change, based on the pitch difference determined by said pitch difference determination section, a frequency of the input speech to make the pitch of the input speech have the predetermined relationship with the pitch of the speech recognition reference data.

11. (New) The input speech pitch normalization device as claimed in claim 10, further comprising:

a memory operable to temporarily store the input speech; and

a read-out controller operable to read a string of the input speech from said memory, and generate a recognition target speech signal, wherein

said pitch difference determination section comprises:

a frequency component analyzer operable to analyze a frequency component in the recognition target speech signal, and generate a frequency component signal; and

a pitch determination device operable to find a base frequency of the recognition target speech signal based on the frequency component signal, and determine a pitch difference between the speech recognition reference data and the base frequency to generate a pitch difference signal.

12. (New) The input speech pitch normalization device as claimed in claim 11, wherein said pitch determination device is operable to stably determine the pitch difference when the recognition target speech is structured as either a single sound unit or several sound units by finding a first pitch frequency of the recognition target speech signal as the base frequency, and compare the first pitch

frequency of the recognition target speech signal with a first pitch frequency of the speech recognition reference data to find the pitch difference therebetween.

13. **(New)** The input speech pitch normalization device as claimed in claim 12, wherein said pitch change means comprises a read-out clock controller operable to generate a read-out clock signal by determining a frequency of a timing clock at a time of reading from said memory such that a frequency of the recognition target speech signal is changed based on the pitch difference signal, wherein

said memory outputs, based on the read-out clock signal, the recognition target speech signal such that the predetermined relationship in pitch is established with the speech recognition reference data.

14. **(New)** A speech recognition device including said input speech pitch normalization device of claim 13.

15. **(New)** A speech recognition device for recognizing input speech based on speech recognition reference data, said speech recognition device comprising:

an input speech pitch normalization device operable to change a pitch of the input speech to be in a predetermined relationship with a pitch of the speech recognition reference data; and

a speech analyzer operable to compare the input speech changed in pitch and the speech recognition reference data to generate a recognition signal indicating the speech recognition reference data which coincides with the input speech.

16. **(New)** The speech recognition device as claimed in claim 15, further comprising:
a memory operable to temporarily storing the input speech; and
a read-out controller operable to read a string of the input speech from said memory, and generate a recognition target speech signal, wherein
said input speech pitch normalization device comprises:

a frequency component analyzer operable to analyze a frequency component of the recognition target speech signal, and generate a frequency component signal; and

a pitch determination device operable to find a base frequency of the recognition target speech signal, and determine a pitch difference between the speech recognition reference data and the base frequency to generate a pitch difference signal.

17. (New) The speech recognition device as claimed in claim 16, wherein said pitch determination device is operable to stably determine the pitch difference when the recognition target speech is structured as either a single sound unit or several sound units by finding a first pitch frequency of the recognition target speech signal as the base frequency, and compares the first pitch frequency of the recognition target speech signal with a first pitch frequency of the speech recognition reference data to find the pitch difference therebetween.

b' 18. (New) The speech recognition device as claimed in claim 17, wherein said input speech pitch normalization device further comprises a read-out clock controller for generating a read-out clock signal by determining a frequency of a timing clock at a time of reading from said memory such that a frequency of said recognition target speech signal is changed based on the pitch difference signal, wherein

said memory outputs, based on the read-out clock signal, the recognition target speech signal such that the predetermined relationship in pitch is established with the speech recognition reference data.
